



[6450-01-P]

DEPARTMENT OF ENERGY

Office of Energy Efficiency and Renewable Energy

[Case No. WH-003]

**Notice of Petition for Waiver of Thermal Solutions Products, LLC from the
Department of Energy Commercial Water Heater Test Procedure**

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of Petition for Waiver and Request for Public Comments.

SUMMARY: This notice announces receipt of and publishes a petition for waiver from Thermal Solutions Products, LLC (Thermal Solutions) seeking an exemption from specified provisions applicable to standby loss of the U.S. Department of Energy (DOE) test procedure for commercial water heating equipment. The waiver request pertains to Thermal Solutions' specified models of commercial instantaneous water heaters containing 10 gallons or more of water. In its petition, Thermal Solutions contends that its specified water heater models that employ tube-type heat exchangers and are designed to be flow activated cannot be accurately tested using the currently applicable DOE test procedure. Consequently, Thermal Solutions seeks to use an alternate test procedure to address certain issues involved in testing the specific basic models identified in its

petition. DOE solicits comments, data, and information concerning Thermal Solutions' petition and its suggested alternate test procedure.

DATES: DOE will accept comments, data, and information with respect to the Thermal Solutions Petition until **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, identified by case number WH-003, by any of the following methods:

- Federal eRulemaking Portal: <http://www.regulations.gov>. Follow the instructions for submitting comments.
- E-mail: AS_Waiver_Requests@ee.doe.gov Include the case number [Case No. WH-003] in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, Petition for Waiver Case No. WH-003, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-2945. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
- Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza SW, Suite 600, Washington,

DC 20024. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

Docket: The docket, which includes Federal Register notices, comments, and other supporting documents/materials, is available for review at www.regulations.gov. All documents in the docket are listed in the www.regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

For further information on how to submit a comment, or review other public comments and the docket, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

FOR FURTHER INFORMATION CONTACT: Mr. Bryan Berringer, U.S. Department of Energy, Building Technologies Office, Mail Stop EE-5B, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 586-0371. E-mail: Bryan.Berringer@ee.doe.gov.

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 586-9507. E-mail: Eric.Stas@hq.doe.gov.

For information on how to submit or review public comments, contact Ms. Brenda Edwards, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, S.W., Washington, DC 20585-0121. Telephone: (202) 586-2945. Email: Brenda.Edwards@ee.doe.gov.

SUPPLEMENTARY INFORMATION:

I. Background and Authority

Title III, Part C¹ of the Energy Policy and Conservation Act of 1975 (EPCA), Pub. L. 94-163 (42 U.S.C. 6311-6317, as codified), added by Pub. L. 95-619, established the Energy Conservation Program for Certain Industrial Equipment, which includes commercial water heaters, the focus of this notice.² Part C specifically includes definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), and the authority to require information and reports from manufacturers. (42 U.S.C. 6316) With respect to test procedures, Part C authorizes the Secretary of Energy (the Secretary) to prescribe test procedures that are reasonably designed to produce results that measure energy efficiency, energy use, and estimated annual operating costs during a representative average-use cycle, and that are not unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) EPCA also directs DOE to consider amending the existing test procedure for each type of equipment listed each time the industry test procedure is amended for such

¹ For editorial reasons, upon codification in the U.S. Code, Part C was re-designated Part A-1.

² All references to EPCA in this document refer to the statute as amended through the Energy Efficiency Improvement Act of 2015 (EEIA 2015), Pub. L. 114-11 (April 30, 2015).

equipment. (42 U.S.C. 6314(a)(4)) The test procedure for commercial water heaters is contained in the Code of Federal Regulations (CFR) at 10 CFR part 431, subpart G.

DOE's regulations set forth at 10 CFR 431.401 contain provisions that permit a person to seek a waiver from the test procedure requirements for covered equipment if at least one of the following conditions is met: (1) the basic model contains one or more design characteristics that prevent testing according to the prescribed test procedures; or (2) the prescribed test procedures may evaluate the basic model in a manner so unrepresentative of its true energy consumption as to provide materially inaccurate comparative data. 10 CFR 431.401(a)(1). A petitioner must include in its petition any alternate test procedures known to the petitioner to evaluate the basic model in a manner representative of its energy consumption. 10 CFR 431.401(b)(1)(iii). DOE may grant a waiver subject to conditions, including adherence to alternate test procedures. 10 CFR 431.401(f)(2). As soon as practicable after the granting of any waiver, DOE will publish in the Federal Register a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. As soon thereafter as practicable, DOE will publish in the Federal Register a final rule. 10 CFR 431.401(l).

II. Petition for Waiver of Test Procedure

On March 9, 2015, Thermal Solutions filed a petition for waiver from the DOE test procedure at 10 CFR 431.106 to measure standby loss of commercial water heating equipment. This petition addresses Thermal Solutions' specified models of commercial instantaneous water heaters containing 10 gallons or more of water. The current DOE efficiency test procedure for commercial water heaters incorporates by reference the

relevant industry test standard for measuring thermal efficiency and standby loss, as specified in American National Standards Institute (ANSI) ANSI Z21.10.3-2011, Gas-Fired Water Heaters, Volume III, Storage Water Heaters, With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous. In its petition, Thermal Solutions contends that its identified basic models rely on flow of water through the heater to activate the burner, but because the current DOE test procedure does not take into account such units, it does not provide a proper representation of the standby loss of these models. The current standby loss test procedure is designed to test tank-type water heaters which are thermostatically operated. The models for which Thermal Solutions is seeking this test procedure waiver employ tube-type heat exchangers and are designed to be flow activated. To address the apparent shortcomings of ANSI Z21.10.3-2011, Thermal Solutions has submitted to DOE an alternate test procedure for measuring the standby loss of tube-type instantaneous water heaters, as addressed in sections 5.26, 5.27 and E.3 of ANSI Z21.10.3-2013, Gas-Fired Water Heaters, Volume III, Storage Water Heaters, With Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous. Thermal Solutions believes this alternative provides a representative measure of the standby loss of these models.

III. Alternate Test Procedure

EPCA requires that manufacturers use DOE test procedures when making representations about the energy consumption and energy consumption costs of products and equipment covered by the statute. (42 U.S.C. 6293(c); 6314(d)) Consistent representations about the energy efficiency of covered products and equipment are

important for consumers evaluating products when making purchasing decisions and for manufacturers to demonstrate compliance with applicable DOE energy conservation standards. Pursuant to its regulations applicable to waivers and interim waivers from applicable test procedures at 10 CFR 431.401, DOE will consider setting an alternate test procedure for Thermal Solutions in a subsequent Decision and Order.

Thermal Solutions has submitted to DOE an alternate test procedure for measuring the standby loss of tube-type instantaneous water heaters as addressed in ANSI Z21.10.3-2013 sections 5.26, 5.27, and E.3. Specifically, Thermal Solutions has submitted the following alternate test procedure to accurately represent the standby loss of its commercial instantaneous water heaters containing 10 gallons or more of water:

Note: The following alternate test procedure is presented in the context of proposed changes to the referenced portions of ANSI Z21.10.3-2013.

5.26 Capacities Of Storage Vessels

For a water heater including a storage vessel, or any water heater having an input rating of less than 4000 Btu/hr per gallon (1112 kJ/L) of capacity, the storage capacity shall be within ± 5.0 percent of the manufacturer's rated volume.

Method of Test

The storage capacity shall be determined by weighing the system when dry and empty and reweighing it when full or by filling the system with water, the weight of which has

been predetermined. The capacity shall then be computed in gallons and compared with the manufacturer's rated volume.

5.27 Capacities Of Tube Type Water Heaters

The amount of water contained in a tube type water heater or in a water heater which has not been tested under 5.26 shall be determined if it is 10 gallons or more.

Method of Test

The volume of water contained within the water heater shall be determined. This determination shall include all water contained within the unit from the inlet connection to the outlet connection but not the capacity of any separate storage vessels. The volume of water contained within the water heater shall then be computed in gallons.

Note: The following proposed wording would be added to Annex E: Efficiency Test Procedures of ANSI Z21.10.3-2013.

Standby Loss for tank type water heaters shall be determined using Appendix E.2

Standby Loss for tube type water heaters that contain 10 or more gallons within the water heater, as determined under 5.27, shall be determined using Appendix E.3

E.3 Method Of Test For Measuring Standby Loss For Tube Type Instantaneous Water Heaters With 10 or Greater Gallons of Storage

The appliance shall be installed as specified in E.1, Method of Test for Measuring Thermal Efficiency. This test may be conducted immediately following the thermal efficiency test. In this case, start the test after the main burner(s) has shut down and, if applicable, the water pump has shut down. Otherwise the water heater shall be put into operation under the same test conditions specified in E.1 and the outlet water temperature shall be adjusted by varying the rate of flow until temperature is constant at $70 \pm 2^{\circ}\text{F}$ ($21 \pm 1^{\circ}\text{C}$) above the supply temperature. After the outlet temperatures becomes constant, as indicated by no variation in excess of 2°F (1°C) over a 3 minute period, shut down the main burner(s) and, if applicable, wait for the water pump to shut down, and then start the test.

At the start of the test, record the time, ambient temperature, outlet water temperature, supply water temperature and begin measuring the fuel and electric consumption.

During the first hour, outlet water temperature, supply water temperature and the ambient air temperature shall be measured at the end of each 5 minute interval. For the remainder of the test, these measurements shall be made at the end of every 15 minute interval. The

duration of this test shall be 24 hours. If the main burner is firing at 24 hours, continue the test until the main burner and the water pump, if applicable, have shut down.

Immediately after the conclusion of the test, record the total fuel flow and electrical energy consumption, the final ambient air temperature and the final outlet water temperature.

Calculate the average of the ambient air temperatures and the supply water temperatures taken at the end of each time interval, including the initial and final values.

The average hourly standby loss, S , rounded to the nearest Btu per hour, shall be determined by the formula:

$$S = [(Cs(Qs)(H) + Ec) / t] - [(\Delta T_4) / (\Delta T_3)(t)E_t]$$

Where:

Cs = correction applied to the heating value of a gas H , when it is metered at temperature and/or pressure conditions other than the standard conditions for which the value of H is based;

H = higher heating value of gas, Btu per cu. ft. (MJ/m³);

Qs = total fuel flow as metered, cu. ft. (m³);

ΔT_3 = difference between the outlet temperature and the average value of the ambient air temperature, °F (°C);

ΔT_4 = difference between the average supply water temperature and the outlet temperature, °F (°C);

t = duration of test, hrs.;

E_c = electrical energy consumption expressed in Btu (kJ); and

E_t = thermal efficiency as determined under E.1, Method of Test for Measuring Thermal Efficiency

If the main burner(s) does not cycle on during this test, the hourly average standby loss calculation simplifies to:

$$S = \{ (K(V_a)(\Delta T_4) / E_t) + E_c \} / t$$

For water heaters that will not initiate or cause actions that will initiate burner operation, the following simplified procedure may be used to measure the hourly standby loss.

This test may be conducted immediately following the thermal efficiency test. In this case, start the test after the main burner(s) has shut down and, if applicable, the water pump has shut down. Otherwise, provide the electrical connection as specified in E.1, Method of Test for Measuring Thermal Efficiency, and start the test.

At the start of the test, record the time and begin measuring the electric consumption for one hour. Record the duration of the test and the total electrical consumption during the test.

The average hourly standby loss, S , rounded to the nearest Btu per hour, shall be determined by the formula:

$$S = [(((\Delta T_5) k V_a / (E_t))/24) + E_c]$$

Where:

$\Delta T_5 = 70^\circ\text{F}$ (38.9°C), difference between the supply and outlet water

temperatures;

$k = 8.25$ Btu/gallon $^\circ\text{F}$ (4147.6331 J/l $^\circ\text{C}$), the nominal specific heat of water;

V_a = water contained in the water heater expressed in gallons (L), as determined under 5.27;

E_c = electrical energy consumption expressed in Btu (kJ); and

Et = thermal efficiency as determined under E.1, Method of Test for Measuring Thermal Efficiency.

The following basic models are included in Thermal Solutions' petition:

EV(A,S,O)0750W***A*

EV(A,S,O)1000W***A*

EV(A,S,O)1500W***A*

EV(A,S,O)2000W***A*

IV. Summary and Request for Comments

Through this notice, DOE announces receipt of and is publishing Thermal Solutions' petition for waiver from the DOE test procedure for commercial water heaters for its EV(A,S,O)0750W***A*, EV(A,S,O)1000W***A*, EV(A,S,O)1500W***A*, and EV(A,S,O)2000W***A* commercial instantaneous water heater models, which contain 10 gallons or more of water. The petition contains no confidential information. The petition includes a suggested alternate test procedure to determine the thermal efficiency and standby loss of Thermal Solutions' specified basic models of commercial instantaneous water heaters containing 10 gallons or more of water. DOE is considering including this alternate test procedure in its subsequent Decision and Order.

DOE solicits comments from interested parties on all aspects of the petition, including the suggested alternate test procedure and calculation methodology. Pursuant to 10 CFR 431.401(d), any person submitting written comments to DOE must also send a

copy of such comments to the petitioner. The contact information for the petitioner is: Mr. Randy Witmer, Engineering Manager, Thermal Solutions Products, LLC, P.O. Box 3244, Lancaster, PA 17604-3244. All submissions received must include the agency name and case number for this proceeding. Submit electronic comments in WordPerfect, Microsoft Word, Portable Document Format (PDF), or text (American Standard Code for Information Interchange (ASCII)) file format and avoid the use of special characters or any form of encryption. Wherever possible, include the electronic signature of the author. DOE does not accept telefacsimiles (faxes).

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit two copies: one copy of the document marked “confidential” with all of the information believed to be confidential included, and one copy of the document marked “non-confidential” with all of the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Issued in Washington, DC, on May 31, 2016.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy

March 9, 2015

U.S. Department of Energy
Building Technologies Program
Test Procedure Waiver
1000 Independence Avenue, S.W.
Washington, D.C. 20585-0121

Re: Waiver for Test Procedure for Commercial Water Heating Equipment

To Whom It May Concern:

Pursuant to the provisions of 10 C.F.R. § 431.401, Thermal Solutions Products, LLC is hereby applying for a waiver of the standby loss test procedure of 10 C.F.R. §431.106 for the following basic models of commercial instantaneous water heaters containing 10 gallons or more of water (sold under the Thermal Solutions brand name):

- EV(A,S,O)0750W**-*A*
- EV(A,S,O)1000W**-*A*
- EV(A,S,O)1500W**-*A*
- EV(A,S,O)2000W**-*A*

The current Department of Energy efficiency test procedure for commercial water heaters references the relevant test procedures for measuring thermal efficiency and standby loss specified in the standard, ANSI Z21.10.3-2011. The identified basic models rely on flow of water through the heater to activate the burner. As will be explained below, the current test procedure does not provide a proper representation of the standby loss of these models.

The current standby loss test procedure is described in Exhibit G.2 of ANSI Z21.10.3-2011. This procedure is designed to test tank-type water heaters which are thermostatically operated. The basic steps of the procedure are to heat the water within the water heater, turn off the burner or element and then measure all the energy consumption that occurs while the water heater is “standing by” for approximately 24 hours with no water being withdrawn from it. The key measurement of the test procedure is the energy consumed by the burner or heating element when the thermostat senses that the water in the tank has cooled down to the point where it needs to be reheated. The current test does not address water heaters that have no means to activate the burner or heating element if no heated water is being drawn from the unit, i.e. the standby condition.

The models for which Thermal Solutions Products, LLC is seeking this test procedure waiver employ tube type heat exchangers and are designed to be flow activated. That is, the burner does not turn on until water flow through the unit is sensed. Under the current standby loss test procedure, the burner on these models will not fire at any time during

the test, and the resulting standby loss measurement would be nearly zero. That measurement is not representative of the standby loss characteristics of these models. Thermal Solutions Products, LLC believes that the current test procedure evaluates the standby loss of the identified basic models in a manner so unrepresentative of the true energy consumption as to provide materially inaccurate comparative data.

A list of manufacturers of all other basic models marketed in the United States known to Thermal Solutions Products, LLC to incorporate similar design characteristics is included as Attachment A.

An alternative procedure for measuring the standby loss of tube type instantaneous water heaters is included as Attachment B. This alternative procedure is presented as a proposed revision to the ANSI Z21.10.3-2013 standard, with modified and additional wording to address testing of these particular models. Thermal Solutions Products, LLC believes this alternative provides a representative measure of the standby loss of these models. Thermal Solutions Products, LLC requests that DOE grant it a waiver to use this alternative procedure in lieu of the standby loss procedure specified in the current DOE efficiency test procedures for commercial water heaters.

Respectfully submitted,

Randy Witmer
Engineering Manager
Thermal Solutions Products, LLC

Attachment A:
Manufacturers of Commercial Tube Type Water Heaters Containing 10
Gallons of Water or More

A.O. Smith Corporation
11270 W Park Place
PO Box 245008
Milwaukee, WI 53224-3623

HTP, Inc.
120 Braley Rd
P.O. Box 429
East Freetown, MA 02717-1125

Laars Heating Systems Company
20 Industrial Way
Rochester, NH 03867-4296

Lochinvar LLC

300 Maddox Simpson Pkwy
Lebanon, TN 37090-5366

Attachment B:

Proposed Alternate Standby Loss Test Procedure for Commercial Tube Type Water Heaters Containing 10 Gallons of Water or More

Note: The following alternate test procedure is presented in the context of proposed changes to the referenced portions of ANSI Z21.10.3-2013.

5.26 Capacities Of Storage Vessels

For a water heater including a storage vessel, or any water heater having an input rating of less than 4000 Btu/hr per gallon (1112 kJ/L) of capacity, the storage capacity shall be within ± 5.0 percent of the manufacturer's rated volume.

Method of Test

The storage capacity shall be determined by weighing the system when dry and empty and reweighing it when full or by filling the system with water, the weight of which has been predetermined. The capacity shall then be computed in gallons and compared with the manufacturer's rated volume.

5.27 Capacities Of Tube Type Water Heaters

The amount of water contained in a tube type water heater or in a water heater which has not been tested under 5.26 shall be determined if it is 10 gallons or more.

Method of Test

The volume of water contained within the water heater shall be determined. This determination shall include all water contained within the unit from the inlet connection to the outlet connection but not the capacity of any separate storage vessels. The volume of water contained within the water heater shall then be computed in gallons.

Note: The following proposed wording would be added to *Annex E: Efficiency Test Procedures* of ANSI Z21.10.3-2013.

Standby Loss for tank type water heaters shall be determined using Appendix E.2

Standby Loss for tube type water heaters that contain 10 or more gallons within the water heater, as determined under 5.27, shall be determined using Appendix E.3

E.3 Method Of Test For Measuring Standby Loss For Tube Type Instantaneous Water Heaters With 10 or Greater Gallons of Storage

The appliance shall be installed as specified in E.1, Method of Test for Measuring Thermal Efficiency. This test may be conducted immediately following the thermal efficiency test. In this case, start the test after the main burner(s) has shut down and, if applicable, the water pump has shut down. Otherwise the water heater shall be put into operation under the same test conditions specified in E.1 and the outlet water temperature shall be adjusted by varying the rate of flow until temperature is constant at $70 \pm 2^{\circ}\text{F}$ ($21 \pm 1^{\circ}\text{C}$) above the supply temperature. After the outlet temperatures becomes constant, as indicated by no variation in excess of 2°F (1°C) over a 3 minute period, shut down the main burner(s) and, if applicable, wait for the water pump to shut down, and then start the test.

At the start of the test, record the time, ambient temperature, outlet water temperature, supply water temperature and begin measuring the fuel and electric consumption.

During the first hour, outlet water temperature, supply water temperature and the ambient air temperature shall be measured at the end of each 5 minute interval. For the remainder of the test, these measurements shall be made at the end of every 15 minute interval. The duration of this test shall be 24 hours. If the main burner is firing at 24 hours, continue the test until the main burner and the water pump, if applicable, have shut down.

Immediately after the conclusion of the test, record the total fuel flow and electrical energy consumption, the final ambient air temperature and the final outlet water temperature.

Calculate the average of the ambient air temperatures and the supply water temperatures taken at the end of each time interval, including the initial and final values.

The average hourly standby loss, S , rounded to the nearest Btu per hour, shall be determined by the formula:

$$S = [(Cs(Qs)(H) + Ec) / t] - [(\Delta T_4) / (\Delta T_3)(t)E_t]$$

Where

Cs = correction applied to the heating value of a gas H , when it is metered at temperature and/or pressure conditions other than the standard conditions for which the value of H is based;

H = higher heating value of gas, Btu per cu. ft. (MJ/m³);

Qs = total fuel flow as metered, cu. ft. (m³);

ΔT_3 = difference between the outlet temperature and the average value of the ambient air temperature, $^{\circ}\text{F}$ ($^{\circ}\text{C}$);

ΔT_4 = difference between the average supply water temperature and the outlet temperature, °F (°C);

t = duration of test, hrs.;

E_c = electrical energy consumption expressed in Btu (kJ); and

E_t = thermal efficiency as determined under E.1, Method of Test for Measuring Thermal Efficiency

If the main burner(s) does not cycle on during this test, the hourly average standby loss calculation simplifies to:

$$S = \{ (K(V_a)(\Delta T_4) / E_t) + E_c \} / t$$

For water heaters that will not initiate or cause actions that will initiate burner operation, the following simplified procedure may be used to measure the hourly standby loss.

This test may be conducted immediately following the thermal efficiency test. In this case, start the test after the main burner(s) has shut down and, if applicable, the water pump has shut down. Otherwise, provide the electrical connection as specified in E.1, Method of Test for Measuring Thermal Efficiency, and start the test.

At the start of the test, record the time and begin measuring the electric consumption for one hour. Record the duration of the test and the total electrical consumption during the test.

The average hourly standby loss, S, rounded to the nearest Btu per hour, shall be determined by the formula:

$$S = [(((\Delta T_5) k V_a / (E_t))/24) + E_c]$$

Where:

ΔT_5 = 70°F (38.9°C), difference between the supply and outlet water temperatures;

k = 8.25 Btu/gallon °F (4147.6331 J/l°C), the nominal specific heat of water;

V_a = water contained in the water heater expressed in gallons (L), as determined under 5.27;

E_c = electrical energy consumption expressed in Btu (kJ); and

Et = thermal efficiency as determined under E.1, Method of Test for Measuring Thermal Efficiency.

[FR Doc. 2016-13251 Filed: 6/3/2016 8:45 am; Publication Date: 6/6/2016]